

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims**

1. (Currently amended) A method of cleaving a 13-hydroperoxide of linoleic or  $\alpha$ -linolenic acid into a C<sub>6</sub>- aldehyde and a C<sub>12</sub>-oxocarboxylic acid comprising contacting the 13-hydroperoxide with a recombinant protein produced by a vector comprising a nucleic acid encoding a fatty acid 13-hydroperoxide lyase comprising the amino acid sequence set forth in SEQ ID NO:1, wherein said recombinant protein has fatty acid 13-hydroperoxide lyase activity and wherein the amino acid sequence of the recombinant protein is present in a fatty acid 13-hydroperoxide lyase isolated from *Psidium guajava*, thereby cleaving the 13-hydroperoxide.
2. (Currently amended) A method of preparing n-hexanal, 3-(Z)-hexen-1-al, 2-(E)-hexen-1-al, or their corresponding alcohols from 13-hydroperoxy-octadeca-9,11-dienoic acid or 13 hydroperoxy-octadeca-9,11,15-trienoic acid, comprising
  - (a) contacting the 13-hydroperoxy-octadeca-9,11-dienoic acid or the 13 hydroperoxy-octadeca-9,11,15-trienoic acid with a recombinant protein produced by a vector comprising a nucleic acid encoding a fatty acid 13-hydroperoxide lyase comprising the amino acid sequence set forth in SEQ ID NO:1, wherein said recombinant protein has fatty acid 13-hydroperoxide lyase activity and wherein the amino acid sequence of the recombinant protein is present in a fatty acid 13-hydroperoxide lyase isolated from *Psidium guajava*, thereby converting the 13-hydroperoxy-octadeca-9,11-dienoic acid into n-hexanal or the 13 hydroperoxy-octadeca-9,11,15-trienoic acid into 3-(Z)-hexen-1-al; and either
  - (b) recovering the n-hexanal or 3-(Z)-hexen-1-al;

- (b') reducing the n-hexanal into n-hexanol or the 3-(Z)-hexen-1-al into 3-(Z)-hexen-1-ol and recovering the hexanol or 3-(Z)-hexen-1-ol; or
  - (b'') isomerizing the 3-(Z)-hexen-1-al under temperature and pH conditions effective to obtain 2-(E)-hexen-1-al and either recovering the formed 2-(E)-hexen-1-al or reducing the 2-(E)-hexen-1-al to 2-(E)-hexen-1-ol and recovering the 2-(E)-hexen-1-ol from the medium.
3. (Currently amended) A method of preparing a C<sub>6</sub>- aldehyde, a C<sub>12</sub>-oxocarboxylic acid, or their corresponding alcohols, from 13-hydroperoxy-octadeca-9,11-dienoic acid or 13 hydroperoxy-octadeca-9,11,15-trienoic acid, comprising
- (a) contacting the 13-hydroperoxy-octadeca-9,11-dienoic acid or the 13 hydroperoxy-octadeca-9,11,15-trienoic acid with a recombinant protein produced by a vector comprising a nucleic acid encoding a fatty acid 13-hydroperoxide lyase comprising the amino acid sequence set forth in SEQ ID NO:1, wherein said recombinant protein has fatty acid 13-hydroperoxide lyase activity and wherein the amino acid sequence of the recombinant protein is present in a fatty acid 13-hydroperoxide lyase isolated from *Psidium guajava*, thereby converting the 13-hydroperoxy-octadeca-9,11-dienoic acid into the C<sub>6</sub>- aldehyde and the C<sub>12</sub>-oxocarboxylic acid; and either
  - (b) recovering the C<sub>6</sub>- aldehyde or the C<sub>12</sub>-oxocarboxylic acid;
  - (b') reducing the C<sub>6</sub>- aldehyde or the C<sub>12</sub>-oxocarboxylic acid to their corresponding alcohols and recovering the alcohols; or
  - (b'') isomerizing the C<sub>6</sub>- aldehyde or the C<sub>12</sub>-oxocarboxylic acid under temperature and pH conditions effective to obtain the isomeric forms thereof and either recovering

the isomeric forms or reducing the isomeric forms and recovering their corresponding alcohols from the medium.

4. (Original) A method of cleaving a 13-hydroperoxide of linoleic or  $\alpha$ -linolenic acid into a C6- aldehyde and a C12-oxocarboxylic acid comprising contacting the 13-hydroperoxide with a recombinant protein produced by a vector comprising a nucleic acid encoding a fatty acid 13-hydroperoxide lyase comprising the amino acid sequence set forth in SEQ ID NO:2, thereby cleaving the 13-hydroperoxide.

5. (Original) A method of preparing n-hexanal, 3-(Z)-hexen-1-al, 2-(E)-hexen-1-al, or their corresponding alcohols from 13-hydroperoxy-octadeca-9,11-dienoic acid or 13 hydroperoxy-octadeca-9,11,15-trienoic acid, comprising

- (a) contacting the 13-hydroperoxy-octadeca-9,11-dienoic acid or the 13 hydroperoxy-octadeca-9,11,15-trienoic acid with a recombinant protein produced by a vector comprising a nucleic acid encoding a fatty acid 13-hydroperoxide lyase comprising the amino acid sequence set forth in SEQ ID NO:2, thereby converting the 13-hydroperoxy-octadeca-9,11-dienoic acid into n-hexanal or the 13 hydroperoxy-octadeca-9,11,15-trienoic acid into 3-(Z)-hexen-1-al; and either
- (b) recovering the n-hexanal or 3-(Z)-hexen-1-al;
- (b') reducing the n-hexanal into n-hexanol or the 3-(Z)-hexen-1-al into 3-(Z)-hexen-1-ol and recovering the hexanol or 3-(Z)-hexen-1-ol; or
- (b'') isomerizing the 3-(Z)-hexen-1-al under temperature and pH conditions effective to obtain 2-(E)-hexen-1-al and either recovering the formed 2-(E)-hexen-1-al or reducing the 2-(E)-hexen-1-al to 2-(E)-hexen-1-ol and recovering the 2-(E)-hexen-1-ol from the medium.

6. (Original) A method of preparing a C<sub>6</sub>- aldehyde, a C<sub>12</sub>-oxocarboxylic acid, or their corresponding alcohols, from 13-hydroperoxy-octadeca-9,11-dienoic acid or 13 hydroperoxy-octadeca-9,11,15-trienoic acid, comprising
- (a) contacting the 13-hydroperoxy-octadeca-9,11-dienoic acid or the 13 hydroperoxy-octadeca-9,11,15-trienoic acid with a recombinant protein produced by a vector comprising a nucleic acid encoding a fatty acid 13-hydroperoxide lyase comprising the amino acid sequence set forth in SEQ ID NO:2, thereby converting the 13-hydroperoxy-octadeca-9,11-dienoic acid into the C<sub>6</sub>- aldehyde and the C<sub>12</sub>-oxocarboxylic acid; and either
  - (b) recovering the C<sub>6</sub>- aldehyde or the C<sub>12</sub>-oxocarboxylic acid;
  - (b') reducing the C<sub>6</sub>- aldehyde or the C<sub>12</sub>-oxocarboxylic acid to their corresponding alcohols and recovering the alcohols; or
  - (b'') isomerizing the C<sub>6</sub>- aldehyde or the C<sub>12</sub>-oxocarboxylic acid under temperature and pH conditions effective to obtain the isomeric forms thereof and either recovering the isomeric forms or reducing the isomeric forms and recovering their corresponding alcohols from the medium.
7. (Original) A method of cleaving a 13-hydroperoxide of linoleic or  $\alpha$ -linolenic acid into a C<sub>6</sub>- aldehyde and a C<sub>12</sub>-oxocarboxylic acid comprising contacting the 13-hydroperoxide with a recombinant protein produced by a vector comprising a nucleic acid encoding a fatty acid 13-hydroperoxide lyase comprising the amino acid sequence set forth in SEQ ID NO:3, thereby cleaving the 13-hydroperoxide.

8. (Original) A method of preparing n-hexanal, 3-(Z)-hexen-1-al, 2-(E)-hexen-1-al, or their corresponding alcohols from 13-hydroperoxy-octadeca-9,11-dienoic acid or 13 hydroperoxy-octadeca-9,11,15-trienoic acid, comprising
- (a) contacting the 13-hydroperoxy-octadeca-9,11-dienoic acid or the 13 hydroperoxy-octadeca-9,11,15-trienoic acid with a recombinant protein produced by a vector comprising a nucleic acid encoding a fatty acid 13-hydroperoxide lyase comprising the amino acid sequence set forth in SEQ ID NO:3, thereby converting the 13-hydroperoxy-octadeca-9,11-dienoic acid into n-hexanal or the 13 hydroperoxy-octadeca-9,11,15-trienoic acid into 3-(Z)-hexen-1-al; and either
  - (b) recovering the n-hexanal or 3-(Z)-hexen-1-al;
  - (b') reducing the n-hexanal into n-hexanol or the 3-(Z)-hexen-1-al into 3-(Z)-hexen-1-ol and recovering the hexanol or 3-(Z)-hexen-1-ol; or
  - (b'') isomerizing the 3-(Z)-hexen-1-al under temperature and pH conditions effective to obtain 2-(E)-hexen-1-al and either recovering the formed 2-(E)-hexen-1-al or reducing the 2-(E)-hexen-1-al to 2-(E)-hexen-1-ol and recovering the 2-(E)-hexen-1-ol from the medium.
9. (Original) A method of preparing a C<sub>6</sub>- aldehyde, a C<sub>12</sub>-oxocarboxylic acid, or their corresponding alcohols, from 13-hydroperoxy-octadeca-9,11-dienoic acid or 13 hydroperoxy-octadeca-9,11,15-trienoic acid, comprising
- (a) contacting the 13-hydroperoxy-octadeca-9,11-dienoic acid or the 13 hydroperoxy-octadeca-9,11,15-trienoic acid with a recombinant protein produced by a vector comprising a nucleic acid encoding a fatty acid 13-hydroperoxide lyase comprising the amino acid sequence set forth in SEQ ID NO:3, thereby

converting the 13-hydroperoxy-octadeca-9,11-dienoic acid into the C<sub>6</sub>- aldehyde and the C<sub>12</sub>-oxocarboxylic acid; and either

- (b) recovering the C<sub>6</sub>- aldehyde or the C<sub>12</sub>-oxocarboxylic acid;
  - (b') reducing the C<sub>6</sub>- aldehyde or the C<sub>12</sub>-oxocarboxylic acid to their corresponding alcohols and recovering the alcohols; or
  - (b'') isomerizing the C<sub>6</sub>- aldehyde or the C<sub>12</sub>-oxocarboxylic acid under temperature and pH conditions effective to obtain the isomeric forms thereof and either recovering the isomeric forms or reducing the isomeric forms and recovering their corresponding alcohols from the medium.
10. (Original) A method of cleaving a 13-hydroperoxide of linoleic or  $\alpha$ -linolenic acid into a C<sub>6</sub>- aldehyde and a C<sub>12</sub>-oxocarboxylic acid comprising contacting the 13-hydroperoxide with a recombinant protein produced by a vector comprising a nucleic acid encoding a fatty acid 13-hydroperoxide lyase comprising the amino acid sequence set forth in SEQ ID NO:4, thereby cleaving the 13-hydroperoxide.
11. (Original) A method of preparing n-hexanal, 3-(Z)-hexen-1-al, 2-(E)-hexen-1-al, or their corresponding alcohols from 13-hydroperoxy-octadeca-9,11-dienoic acid or 13 hydroperoxy-octadeca-9,11,15-trienoic acid, comprising
- (a) contacting the 13-hydroperoxy-octadeca-9,11-dienoic acid or the 13 hydroperoxy-octadeca-9,11,15-trienoic acid with a recombinant protein produced by a vector comprising a nucleic acid encoding a fatty acid 13-hydroperoxide lyase comprising the amino acid sequence set forth in SEQ ID NO:4, thereby converting the 13-hydroperoxy-octadeca-9,11-dienoic acid into n-hexanal or the 13 hydroperoxy-octadeca-9,11,15-trienoic acid into 3-(Z)-hexen-1-al; and either

- (b) recovering the n-hexanal or 3-(Z)-hexen-1-al;
  - (b') reducing the n-hexanal into n-hexanol or the 3-(Z)-hexen-1-al into 3-(Z)-hexen-1-ol and recovering the hexanol or 3-(Z)-hexen-1-ol; or
  - (b'') isomerizing the 3-(Z)-hexen-1-al under temperature and pH conditions effective to obtain 2-(E)-hexen-1-al and either recovering the formed 2-(E)-hexen-1-al or reducing the 2-(E)-hexen-1-al to 2-(E)-hexen-1-ol and recovering the 2-(E)-hexen-1-ol from the medium.
12. (Original) A method of preparing a C<sub>6</sub>- aldehyde, a C<sub>12</sub>-oxocarboxylic acid, or their corresponding alcohols, from 13-hydroperoxy-octadeca-9,11-dienoic acid or 13 hydroperoxy-octadeca-9,11,15-trienoic acid, comprising
- (a) contacting the 13-hydroperoxy-octadeca-9,11-dienoic acid or the 13 hydroperoxy-octadeca-9,11,15-trienoic acid with a recombinant protein produced by a vector comprising a nucleic acid encoding a fatty acid 13-hydroperoxide lyase comprising the amino acid sequence set forth in SEQ ID NO:4, thereby converting the 13-hydroperoxy-octadeca-9,11-dienoic acid into the C<sub>6</sub>- aldehyde and the C<sub>12</sub>-oxocarboxylic acid; and either
  - (b) recovering the C<sub>6</sub>- aldehyde or the C<sub>12</sub>-oxocarboxylic acid;
  - (b') reducing the C<sub>6</sub>- aldehyde or the C<sub>12</sub>-oxocarboxylic acid to their corresponding alcohols and recovering the alcohols; or
  - (b'') isomerizing the C<sub>6</sub>- aldehyde or the C<sub>12</sub>-oxocarboxylic acid under temperature and pH conditions effective to obtain the isomeric forms thereof and either recovering

the isomeric forms or reducing the isomeric forms and recovering their corresponding alcohols from the medium.

13. (Original) A method of cleaving a 13-hydroperoxide of linoleic or  $\alpha$ -linolenic acid into a  $C_6$ - aldehyde and a  $C_{12}$ -oxocarboxylic acid comprising contacting the 13-hydroperoxide with a recombinant protein produced by a vector comprising a nucleic acid encoding a fatty acid 13-hydroperoxide lyase comprising the amino acid sequence set forth in SEQ ID NO:6, thereby cleaving the 13-hydroperoxide.
14. (Original) A method of preparing n-hexanal, 3-(Z)-hexen-1-al, 2-(E)-hexen-1-al, or their corresponding alcohols from 13-hydroperoxy-octadeca-9,11-dienoic acid or 13 hydroperoxy-octadeca-9,11,15-trienoic acid, comprising
  - (a) contacting the 13-hydroperoxy-octadeca-9,11-dienoic acid or the 13 hydroperoxy-octadeca-9,11,15-trienoic acid with a recombinant protein produced by a vector comprising a nucleic acid encoding a fatty acid 13-hydroperoxide lyase comprising the amino acid sequence set forth in SEQ ID NO:6, thereby converting the 13-hydroperoxy-octadeca-9,11-dienoic acid into n-hexanal or the 13 hydroperoxy-octadeca-9,11,15-trienoic acid into 3-(Z)-hexen-1-al; and either
  - (b) recovering the n-hexanal or 3-(Z)-hexen-1-al;
  - (b') reducing the n-hexanal into n-hexanol or the 3-(Z)-hexen-1-al into 3-(Z)-hexen-1-ol and recovering the hexanol or 3-(Z)-hexen-1-ol; or
  - (b'') isomerizing the 3-(Z)-hexen-1-al under temperature and pH conditions effective to obtain 2-(E)-hexen-1-al and either recovering the formed 2-(E)-hexen-1-al or reducing the 2-(E)-hexen-1-al to 2-(E)-hexen-1-ol and recovering the 2-(E)-hexen-1-ol from the medium.



15. (Original) A method of preparing a C<sub>6</sub>- aldehyde, a C<sub>12</sub>-oxocarboxylic acid, or their corresponding alcohols, from 13-hydroperoxy-octadeca-9,11-dienoic acid or 13 hydroperoxy-octadeca-9,11,15-trienoic acid, comprising
- (a) contacting the 13-hydroperoxy-octadeca-9,11-dienoic acid or the 13 hydroperoxy-octadeca-9,11,15-trienoic acid with a recombinant protein produced by a vector comprising a nucleic acid encoding a fatty acid 13-hydroperoxide lyase comprising the amino acid sequence set forth in SEQ ID NO:6, thereby converting the 13-hydroperoxy-octadeca-9,11-dienoic acid into the C<sub>6</sub>- aldehyde and the C<sub>12</sub>-oxocarboxylic acid; and either
  - (b) recovering the C<sub>6</sub>- aldehyde or the C<sub>12</sub>-oxocarboxylic acid;
  - (b') reducing the C<sub>6</sub>- aldehyde or the C<sub>12</sub>-oxocarboxylic acid to their corresponding alcohols and recovering the alcohols; or
  - (b'') isomerizing the C<sub>6</sub>- aldehyde or the C<sub>12</sub>-oxocarboxylic acid under temperature and pH conditions effective to obtain the isomeric forms thereof and either recovering the isomeric forms or reducing the isomeric forms and recovering their corresponding alcohols from the medium.
16. (Currently Amended) A method of cleaving a 13-hydroperoxide of linoleic or  $\alpha$ -linolenic acid into a C<sub>6</sub>- aldehyde and a C<sub>12</sub>-oxocarboxylic acid comprising contacting the 13-hydroperoxide with a recombinant protein produced by a vector comprising a nucleic acid encoding a fatty acid 13-hydroperoxide lyase, wherein the nucleic acid specifically hybridizes with the nucleic acid of SEQ ID NO: 7 under stringent hybridization conditions of hybridization at 5 to 20°C below the T<sub>m</sub> in 6X SSPE followed by washing at the same temperature and does not hybridize under stringent conditions to the nucleic acid set forth in SEQ ID NO: 11 or SEQ ID NO: 12, thereby cleaving the 13-

hydroperoxide, and wherein the recombinant protein has fatty acid 13-hydroperoxide lyase activity.

17. (Currently Amended) A method of preparing n-hexanal, 3-(Z)-hexen-1-al, 2-(E)-hexen-1-al, or their corresponding alcohols from 13-hydroperoxy-octadeca-9,11-dienoic acid or 13 hydroperoxy-octadeca-9,11,15-trienoic acid, comprising
- (a) contacting the 13-hydroperoxy-octadeca-9,11-dienoic acid or the 13 hydroperoxy-octadeca-9,11,15-trienoic acid with a recombinant protein produced by a vector comprising a nucleic acid encoding a fatty acid 13-hydroperoxide lyase, wherein the nucleic acid specifically hybridizes with the nucleic acid of SEQ ID NO: 7 under stringent hybridization conditions of hybridization at 5 to 20°C below the  $T_m$  in 6X SSPE followed by washing at the same temperature and does not hybridize under stringent conditions to the nucleic acid set forth in SEQ ID NO: 11 or SEQ ID NO: 12, and wherein the recombinant protein has fatty acid 13-hydroperoxide lyase activity, thereby converting the 13-hydroperoxy-octadeca-9,11-dienoic acid into n-hexanal or the 13 hydroperoxy-octadeca-9,11,15-trienoic acid into 3-(Z)-hexen-1-al; and either
  - (b) recovering the n-hexanal or 3-(Z)-hexen-1-al;
  - (b') reducing the n-hexanal into n-hexanol or the 3-(Z)-hexen-1-al into 3-(Z)-hexen-1-ol and recovering the hexanol or 3-(Z)-hexen-1-ol; or
  - (b'') isomerizing the 3-(Z)-hexen-1-al under temperature and pH conditions effective to obtain 2-(E)-hexen-1-al and either recovering the formed 2-(E)-hexen-1-al or reducing the 2-(E)-hexen-1-al to 2-(E)-hexen-1-ol and recovering the 2-(E)-hexen-1-ol from the medium.

18. (Currently Amended) A method of preparing a C<sub>6</sub>- aldehyde, a C<sub>12</sub>-oxocarboxylic acid, or their corresponding alcohols, from 13-hydroperoxy-octadeca-9,11-dienoic acid or 13 hydroperoxy-octadeca-9,11,15-trienoic acid, comprising
- (a) contacting the 13-hydroperoxy-octadeca-9,11-dienoic acid or the 13 hydroperoxy-octadeca-9,11,15-trienoic acid with a recombinant protein produced by a vector comprising a nucleic acid encoding a fatty acid 13-hydroperoxide lyase, wherein the nucleic acid specifically hybridizes with the nucleic acid of SEQ ID NO: 7 under stringent hybridization conditions of hybridization at 5 to 20°C below the T<sub>m</sub> in 6X SSPE followed by washing at the same temperature and does not hybridize under stringent conditions to the nucleic acid set forth in SEQ ID NO: 11 or SEQ ID NO: 12, and wherein the recombinant protein has fatty acid 13-hydroperoxide lyase activity, thereby converting the 13-hydroperoxy-octadeca-9,11-dienoic acid into the C<sub>6</sub>- aldehyde and the C<sub>12</sub>-oxocarboxylic acid; and either
  - (b) recovering the C<sub>6</sub>- aldehyde or the C<sub>12</sub>-oxocarboxylic acid;
  - (b') reducing the C<sub>6</sub>- aldehyde or the C<sub>12</sub>-oxocarboxylic acid to their corresponding alcohols and recovering the alcohols; or
  - (b'') isomerizing the C<sub>6</sub>- aldehyde or the C<sub>12</sub>-oxocarboxylic acid under temperature and pH conditions effective to obtain the isomeric forms thereof and either recovering the isomeric forms or reducing the isomeric forms and recovering their corresponding alcohols from the medium.
19. (Previously presented) The method of claim 16, wherein the nucleic acid has at least 80% complementarity with the sequence to which it hybridizes.

20. (Previously presented) The method of claim 17, wherein the nucleic acid has at least 80% complementarity with the sequence to which it hybridizes.
21. (Previously presented) The method of claim 18, wherein the nucleic acid has at least 80% complementarity with the sequence to which it hybridizes.